

WHAT IS CLAIMED IS

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1. In a code division multiple access  
radio communication system, a power calculation  
method for calculating a power of a radio wave in a  
radio channel included in a radio line established  
10 between a transmitting station and a receiving  
station in the system, comprising the step of:

calculating the power of the radio wave of  
the radio channel, with using a transmission power  
of the radio channel and a total transmission power  
15 including the transmission power of the radio  
channel.

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2. A power calculation method as claimed  
in Claim 1, wherein

the transmission power of the radio  
channel and a ratio of the transmission power of the  
25 radio channel to a total transmission power are used  
for calculating the power of the radio wave of the  
radio channel.

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3. A power calculation method as claimed  
in Claim 1, wherein

the total transmission power and a ratio  
35 of the transmission power of the radio channel to  
the total transmission power are used for  
calculating the power of the radio wave of the radio

channel.

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4. A power calculation method as claimed in claim 1, wherein a required receiving power R in the radio channel is calculated by a following formula:

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$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{P_{total}}{P}}$$

herein,

$R_0$  is a required receiving power when interference does not exist at all at a receiver,

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$\Lambda$  is a signal to noise (interference is included) power ratio required at the receiver,

$pg$  is a spread gain,

$P$  is the transmission power of the predetermined radio channel transmitted from the transmitting station, and

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$P_{total}$  is the total power transmitted from the transmitting station.

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5. A power calculation method as claimed in claim 3, wherein a following formula is used to calculate a required receiving power R at a receiver.

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{1}{\xi}}$$

herein,

5  $R_0$  is a required receiving power when interference does not exist at all at the receiver,

$\Lambda$  is a signal to noise (interference is included) power ratio needed by the receiver,

$pg$  is a spread gain, and

10  $\xi$  is a ratio of the transmission power of the predetermined radio channel transmitted from the transmitting station to the total transmission power.

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6. A power calculation method as claimed in claim 3, wherein the power of the radio wave of the radio channel is calculated using a coefficient that estimates an amount of interference received  
20 from the transmitting station with which the receiving station is in communication.

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7. A power calculation method as claimed in claim 3, wherein the power of the radio wave of the radio channel is calculated using a coefficient representing a ratio of a sum of interference

amounts from transmitting stations other than the  
transmitting station in communication with the  
receiving station, and interference power from the  
transmitting station in communication with the  
5 receiving station.

10 8. A power calculation method as claimed  
in claim 6, wherein the required receiving power R  
is calculated by one of following formulas:

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{P_{total}}{P} \cdot \gamma}$$

15

or

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{\gamma}{\xi}}$$

herein,

20  $R_0$  is a required receiving power when  
interference does not exist at all at the receiving  
station,

$\Lambda$  is a signal to noise (interference is

included) power ratio required by the receiving station,

$pg$  is a spread gain,

$P$  is the transmission power of the

5 predetermined radio channel transmitted from the transmitting station,

$P_{total}$  is the total transmission power from the transmitting station,

10  $\xi$  is a ratio of the transmission power of the predetermined radio channel transmitted from the transmitting station to the total transmission power, and

15  $\gamma$  is a coefficient multiplied to interference from the transmitting station in communication with the receiving station.

20 9. A power calculation method as claimed in claim 7, wherein the required receiving power  $R$  is calculated according to one of following formulas:

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{P_{total}}{P} \cdot (1 + F)}$$

or

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{1+F}{\xi}}$$

herein,

5  $R_0$  is a required receiving power when interference does not exist at all at the receiving station,

$\Lambda$  is a signal to noise (interference is included) power ratio required at the receiving station,

10  $pg$  is a spread gain,

$P$  is the transmission power of the predetermined radio channel transmitted from the transmitting station,

15  $P_{\text{total}}$  is the total transmission power from the transmitting station,

$\xi$  is a ratio of the transmission power of the predetermined radio channel transmitted from the transmitting station to the total transmission power, and

20  $F$  is a power ratio of a total interference from transmitting stations other than the transmitting station in communication with the receiving station, and an interference from the transmitting station in communication with the  
25 receiving station.

10. A power calculation method as claimed in claim 8, wherein the required receiving power of the radio channel is calculated according to one of following formulas:

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$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{P_{total}}{P} \cdot (\gamma + F)}$$

or

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{\gamma + F}{\xi}}$$

10

herein,

$R_0$  is a required receiving power when interference does not exist at all at the receiving station,

15

$\Lambda$  is a signal to noise (interference is included) power ratio required at the receiving station,

$pg$  is a spread gain,

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$P$  is the transmission power of the predetermined radio channel transmitted from the transmitting station,

$P_{total}$  is the total transmission power from the transmitting station,

$\xi$  is a ratio of the transmission power of the predetermined radio channel transmitted from the transmitting station to the total transmission power,

5  $\gamma$  is a coefficient multiplied to interference from the transmitting station in communication with the receiving station, and

10  $F$  is a power ratio of a total interference from transmitting stations other than the transmitting station in communication with the receiving station, and an interference from the transmitting station in communication with the receiving station.

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11. In a code division multiple access radio communication system, a power calculation apparatus for calculating a power of a radio wave in  
20 a radio channel included in a radio line established between a transmitting station and a receiving station in the system, comprising:

power calculation means that calculates the power of the radio wave of the radio channel,  
25 with using a transmission power of the radio channel and a total transmission power including the transmission power of the radio channel.

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12. A power calculation apparatus as claimed in Claim 11, wherein

the power calculation means uses the  
35 transmission power of the radio channel and a ratio of the transmission power of the radio channel to a total transmission power, for calculating the power



of the radio wave of the radio channel.

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13. A power calculation apparatus as claimed in Claim 11, wherein

the power calculation means uses the total transmission power and a ratio of the transmission power of the radio channel to the total transmission power, for calculating the power of the radio wave of the radio channel.

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14. A power calculation apparatus as claimed in claim 11, wherein the power calculation means calculates a required receiving power R in the radio channel by a following formula:

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{P_{total}}{P}}$$

herein,

25  $R_0$  is a required receiving power when interference does not exist at all at a receiver,

$\Lambda$  is a signal to noise (interference is included) power ratio required at the receiver,

$pg$  is a spread gain,

$P$  is the transmission power of the

predetermined radio channel transmitted from the transmitting station, and

$P_{\text{total}}$  is the total power transmitted from the transmitting station.

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15. A power calculation apparatus as claimed in claim 13, wherein the power calculation means uses a following formula to calculate a required receiving power  $R$  at a receiver.

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{1}{\xi}}$$

15

herein,

$R_0$  is a required receiving power when interference does not exist at all at the receiver,

$\Lambda$  is a signal to noise (interference is included) power ratio needed by the receiver,

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$pg$  is a spread gain, and

$\xi$  is a ratio of the transmission power of the predetermined radio channel transmitted from the transmitting station to the total transmission power.

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16. A power calculation apparatus as claimed in claim 13, wherein the power calculation

means calculates the power of the radio wave of the  
radio channel using a coefficient that estimates an  
amount of interference received from the  
transmitting station with which the receiving  
5 station is in communication.

10 17. A power calculation apparatus as  
claimed in claim 13, wherein the power calculation  
means calculates the power of the radio wave of the  
radio channel using a coefficient representing a  
ratio of a sum of interference amounts from  
15 transmitting stations other than the transmitting  
station in communication with the receiving station,  
and interference power from the transmitting station  
in communication with the receiving station.

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18. A power calculation method as claimed  
in claim 16, wherein the power calculation means  
25 calculates the required receiving power  $R$  by one of  
following formulas:

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{P_{total}}{P} \cdot \gamma}$$

or

$$R = R_0 \frac{1}{1 - \frac{\Lambda \cdot \gamma}{pg \xi}}$$

herein,

5  $R_0$  is a required receiving power when interference does not exist at all at the receiving station,

$\Lambda$  is a signal to noise (interference is included) power ratio required by the receiving station,

10  $pg$  is a spread gain,

$P$  is the transmission power of the predetermined radio channel transmitted from the transmitting station,

15  $P_{total}$  is the total transmission power from the transmitting station,

$\xi$  is a ratio of the transmission power of the predetermined radio channel transmitted from the transmitting station to the total transmission power, and

20  $\gamma$  is a coefficient multiplied to interference from the transmitting station in communication with the receiving station.

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19. A power calculation apparatus as claimed in claim 17, wherein the power calculation means calculates the required receiving power  $R$

according to one of following formulas:

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{P_{total}}{P} \cdot (1 + F)}$$

5 or

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{1 + F}{\xi}}$$

herein,

10  $R_0$  is a required receiving power when interference does not exist at all at the receiving station,

$\Lambda$  is a signal to noise (interference is included) power ratio required at the receiving station,

$pg$  is a spread gain,

15  $P$  is the transmission power of the predetermined radio channel transmitted from the transmitting station,

$P_{total}$  is the total transmission power from the transmitting station,

20  $\xi$  is a ratio of the transmission power of the predetermined radio channel transmitted from the transmitting station to the total transmission power,

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and

F is a power ratio of a total interference from transmitting stations other than the transmitting station in communication with the receiving station, and an interference from the transmitting station in communication with the receiving station.

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20. A power calculation apparatus as claimed in claim 18, wherein the power calculation means calculates the required receiving power of the radio channel according to one of following formulas:

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{P_{total}}{P} \cdot (\gamma + F)}$$

20 or

$$R = R_0 \frac{1}{1 - \frac{\Lambda}{pg} \cdot \frac{\gamma + F}{\xi}}$$

herein,

$R_0$  is a required receiving power when interference does not exist at all at the receiving station,

5  $\Lambda$  is a signal to noise (interference is included) power ratio required at the receiving station,

$pg$  is a spread gain,

10  $P$  is the transmission power of the predetermined radio channel transmitted from the transmitting station,

$P_{total}$  is the total transmission power from the transmitting station,

15  $\xi$  is a ratio of the transmission power of the predetermined radio channel transmitted from the transmitting station to the total transmission power,

$\gamma$  is a coefficient multiplied to interference from the transmitting station in communication with the receiving station, and

20  $F$  is a power ratio of a total interference from transmitting stations other than the transmitting station in communication with the receiving station, and an interference from the transmitting station in communication with the receiving station.

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